72270

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

November 10, 1994

Stephen Lester, District Engineer
Pennsylvania Department of Transportation
200 Radnor-Chester Road
St. Davids, Pennsylvania 19087

Re: Exton Bypass Construction, Wetlands Replacement Site at The Church Farm School

Dear Mr. Lester:

I am writing regarding the above referenced wetlands restoration project and its affect on the AIW Frank/Mid-County Mustang Superfund Site ("AIWF Site") which is located a few hundred feet southeast of the project (see enclosed site location map). I am aware that PENNDOT has been in contact with representatives on the State and Federal level in the past regarding the wetlands restoration and the AIWF Site, however, I am writing specifically with regard to the situation I discovered during a site visit I made on November 4, 1994.

During the site visit of November 4, 1994, I conducted a visual inspection of all the monitoring wells relating to the Site. As part of my inspection, I attempted to locate monitoring wells MW-105A, MW-105B, MW-109A and MW-109B (see enclosed site location map). It became apparent to me during my inspection that these wells had been located in the wetlands restoration area recently constructed by your department. After visually trying to locate the wells with no success, I spoke with Mr. Kevin Dougherty of A.D. Marble & Company who identified himself as the project manager for the restoration project. He stated that the wells had been located in the restoration area, but that the construction subcontractor had broken the wells off during construction. Mr. Dougherty was under the impression that someone at PENNDOT had checked into the ownership of the wells and had received permission to grade over the wells. However, after checking with the previous Remedial Project Manager and reviewing AIWF Site files here at EPA, I discovered that no one had contacted the Superfund program with the final design of the restoration project or prior to beginning actual construction. Mr. Dougherty stated that he would have PENNDOT contact me regarding the wells and the wetlands restoration.

On November 7, 1994, I was contacted by Ester McGinnis, PENNDOT District Environmental Manager. After briefly discussing the situation and possible implications and remedies, Ms. McGinnis requested that I write to you. During the conversation, I agreed to provide additional information regarding the type of monitoring wells which had been destroyed and the extent of groundwater contamination migrating from the AIWF Site (see enclosed).

PENNDOT replacement of the monitoring wells to specifications and in locations mutually acceptable to both EPA and PENNDOT seems to be the most workable approach at this time. However, I am more than willing to discuss the situation further to resolve the situation in a mutually acceptable manner. With that in mind, I would like to take this opportunity to request that representatives of PENNDOT and EPA meet to discuss the issue further. Please contact me with regard to setting up a convenient time and location for such a meeting. I can be reached at (215) 597-8240. Also, please feel free to contact me with any other questions you may have with regard to the AIWF site. I look forward to hearing from you.

Sincerely,

Charles J. Root

Charles J. Root, Project Manager
S. E. Pennsylvania Remedial Section

enclosure

cc: Ester McGinnis, PENNDOT
P. Anderson (3HW21)
R. Carter (3RC21)

- Philadelphia Suburban Water Company
- West Whiteland Municipal Authority
- Great Valley Water Company
- West Chester Municipal Authority
- PA DER
- U.S. Geological Survey
- Chester County Health Department

Once the properties were identified, a door-to-door survey was conducted to confirm properties with groundwater wells and gather information regarding these wells. Information obtained from the well survey included, owner, address, location of well, approximate well installation date, well depth, number of users, water treatment, existing water quality, and water usage. NUS personnel visited the properties at which a questionnaire was completed by the well owners or users. Questionnaires were left at the door if nobody was available during the door-to-door surveys. At each property where a questionnaire was left, an attempt was made to retrieve a completed questionnaire as soon as possible.

After a review of the completed questionnaires, the nearby local wells were located on a base map. This survey produced a list of properties and well owners which is presented in Table 3.3 and discussed in Section 3.6.2.2.

2.3.2.2 Well Installation

Thirteen monitoring wells were installed at the AIW Frank/Mid-County Mustang Site to investigate the impacts of past plant activities on groundwater quality and to define the overall local hydrogeologic conditions (Figure 2.3). Sources of groundwater contamination were identified and delineated to the extent possible. Both single well locations and well pairings were used to determine lateral and vertical variations in groundwater quality and hydraulic head. Groundwater flow directions and rates at the facility and surrounding area were determined in order to predict migration patterns of groundwater and contaminants.

A total of five shallow, five intermediate, and three deep bedrock wells were installed for the field investigation (Table 2.2). Of these thirteen monitoring wells, five well pairings exist and were classified into one shallow/shallow well pairing, two shallow/intermediate well pairings and two intermediate/deep well pairings. The well pairings were installed to evaluate vertical trends in contaminant levels and identify hydraulic head differentials with depth within the aquifer. The monitoring well locations are shown in Figure 2.3. Well locations were selected with the aid of the EPIC fracture trace analysis. For example, wells MW-109A and MW-109B were purposely located on an apparent fracture trace identified on the EPIC aerial photo analysis. Well locations were also checked for the presence of underground utilities prior to beginning drilling operations, and the locations modified as necessary to avoid any utilities present.

AR301204

TABLE 2.2

RATIONALE FOR CLASSIFICATION OF MONITORING WELLS

Well Number	Depth of Overburden Bedrock Contact	Penetration Depth into Bedrock	Approximate Open Bore/Screen Depth (feet)	Classification
MW-1	4	46	8.5-50	Shallow Bedrock
MW-2[1]	Not reached	0	23-43	Overburden
MW-3	6	44	35-50	Shallow Bedrock
MW-101[1]	75	25	80-100	Shallow Bedrock
MW-103A[1]	8	32	20-40	Shallow Bedrock
MW-103B	55	77	68-132	Intermediate Bedrock
MW-104A	14	81	25-95	Intermediate Bedrock
MW-104B	10	130	105-140	Deep Bedrock
MW-105A	10	90	20-100	Intermediate Bedrock
MW-105B	25	150	110-175	Deep Bedrock
MW-106	16	62	26-78	Intermediate Bedrock
MW-107A	17	38	28-55	Shallow Bedrock
MW-107B	21	59	65-80	Intermediate Bedrock
MW-108A	48	149	65-197	Deep Bedrock
MW-109A[2]	17	22	26-39	Shallow Bedrock
MW-109B	45	25	56-70	Shallow Bedrock
P-1	Unknown	Unknown	64-85	Intermediate Bedrock
F-1	Unknown	Unknown	17-223	Deep Bedrock
F-2	Unknown	Unknown	UK-172	Deep Bedrock

(1) 4-inch PVC monitoring well
(2) 2-inch PVC monitoring well

AR301205

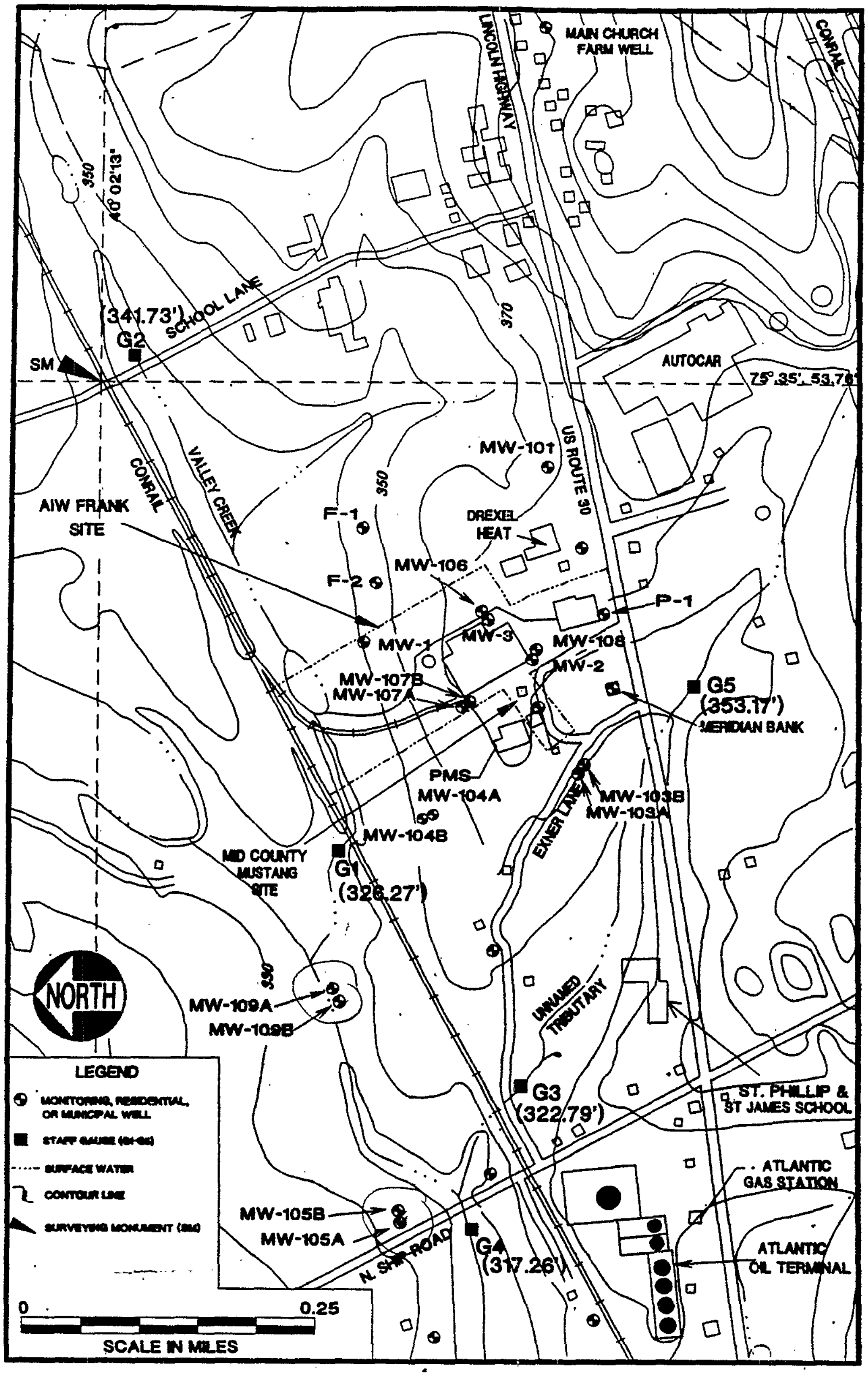


Figure 2.3 Monitoring well and existing well location map.

AR301206

The shallow wells were installed across the first significant water-bearing fracture zone encountered in bedrock at each drilling location. These wells were drilled to a depth between 39 and 100 feet below the ground surface and penetrated into the underlaying bedrock by 22 to 38 feet.

The intermediate wells were completed within the uppermost significant water-yielding fracture zone encountered or within the second water-yielding zone encountered, if the well was paired with a shallow well. The intermediate wells were drilled to a depth between 78 to 132 feet below the ground surface. The wells penetrated bedrock between 59 and 77 feet when paired with a shallow well, and between 81 and 90 feet when paired with a deep well. Only one intermediate well, MW-106, was not paired with another. This well penetrated 62 feet into the underlying bedrock.

The deep classified wells were installed to monitor selected water-yielding fracture zones encountered at greater depths within the bedrock aquifer. These wells were drilled at depths between 140 and 197 feet below ground surface and penetrated into the underlying bedrock by 130 to 150 feet.

Borings were advanced through the cased off overburden into competent rock by air rotary methods. The boring was continued into bedrock to the final desired depth, using air rotary drilling methods. The borehole diameter in bedrock was six inches. Bedrock monitoring wells were either left as open borehole wells, or completed by installing 2-inch or 4-inch PVC screen and riser into the borehole, then installing a sand pack, bentonite seal, and annular cement/bentonite grout backfill. Typical well construction diagrams for screened and open borehole wells are provided in Figure 2.4 and 2.5, respectively. Table 2.3 presents the construction details on well completion for both screened and open borehole wells.

Precautions were taken to prevent cross contamination between overburden and bedrock during bedrock well drilling procedures. For shallow wells, overburden was cased off through the zone of weathered bedrock and at least 5 feet into competent bedrock prior to completing each well. Steel casing was displacement grouted into place with cement-bentonite grout (6 percent bentonite) and allowed to dry for a minimum of 24 hours prior to advancing the boring. Shallow or intermediate well borings, as mentioned previously, were advanced to the first significant water bearing fracture zone encountered below the casing.

Deep wells were completed by drilling and setting displacement grouted 6-inch steel casing to a depth of approximately 10 feet below the bottom of the adjacent intermediate monitoring well, then advanced to the next significant water-yielding zone. Upon reaching the selected final depth, the United States Geological Survey (USGS) geophysically logged the bore holes.

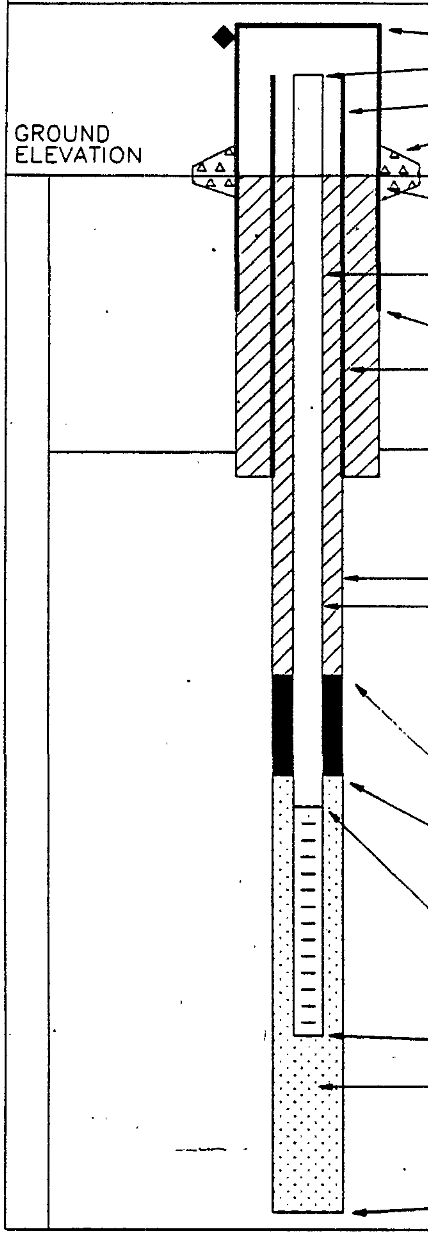
During the drilling of each well, cuttings were logged by the site geologist to characterize site stratigraphy. In addition, other pertinent observations were noted to describe subsurface conditions encountered.

AR301207

BORING NO. : ______

BEDROCK
MONITORING WELL SHEET
WELL INSTALLED IN BEDROCK

PROJECT ADW FRANK/MID COUNTY
LOCATION EXTON, PA
PROJECT NO. ______
BORING ______
ELEVATION ______
DATE ______
FIELD GEOLOGIST ______
DRILLER REICHART
DRILLING METHOD AIR ROTARY/ODEX
DEVELOPMENT METHOD ______



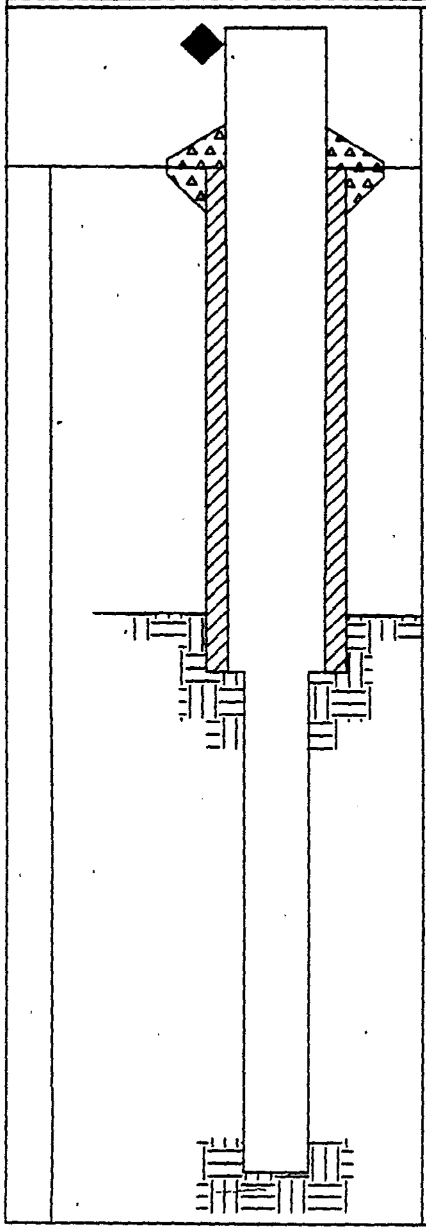
ELEVATION OF TOP OF SURFACE CASING : 327.32 TO 371.33 FT BLS
ELEVATION OF TOP OF RISER PIPE : 327.09 TO 371.13 FT BLS
ELEVATION TOP OF PERM CASING : ______
TYPE OF SURFACE SEAL : GROUT/BENTONITE
I.D. OF SURFACE CASING : 6"
TYPE OF SURFACE CASING : STEEL
RISER PIPE I.D. 2" OR 4"
TYPE OF RISER PIPE : SCH. 40 PVC
BOREHOLE DIAMETER : 8"
PERM. CASING I.D. ______
TYPE OF CASING & BACKFILL : GROUT/BENTONITE
ELEVATION/DEPTH TO BEDROCK : 8 TO 75 FT BLS
ELEVATION/DEPTH BOTTOM OF CASING : ______
BOREHOLE DIA. BELOW CASING : 6"
TYPE OF BACKFILL : GROUT/BENTONITE
ELEVATION/DEPTH TOP OF SEAL : 16 TO 75 FT BLS
TYPE OF SEAL : BENTONITE
ELEVATION/DEPTH TOP OF SAND PACK : 18 TO 72 FT BLS
ELEVATION/DEPTH TOP OF SCREEN : 20 TO 80 FT BLS
TYPE OF SCREEN : SCH 40 PVC, 0.02 SLOTTED
TYPE OF SAND PACK : MORIE SAND
ELEVATION/DEPTH BOTTOM OF SCREEN : 39 TO 100 FT BLS
ELEVATION/DEPTH BOTTOM OF SAND PACK : ______
TYPE OF BACKFILL BELOW OBSERVATION WELL : MORIE SAND
ELEVATION/DEPTH HOLE : 40 TO 102 FT BLS

Figure 2.4 Typical well construction diagram for a screened PVC monitoring well.

AR301208

BEDROCK
MONITORING WELL SHEET
OPEN HOLE WELL

PROJECT AIW FRANK/MID COUNTY	LOCATION EXTON, PA	DRILLER REICHART
PROJECT NO.	BORING	DRILLING METHOD AIR ROTARY/ODEX
ELEVATION	DATE	DEVELOPMENT METHOD
FIELD GEOLOGIST		



ELEVATION OF TOP OF CASING : 334.30 TO 373.10 FT

STICK OF CASING ABOVE GROUND SURFACE : 0.86 TO 3.92 FT

TYPE OF SURFACE SEAL : GROUT/BENTONITE

I.D. OF CASING : 6"

TYPE OF CASING : STEEL

TEMP./PERM :

DIAMETER OF HOLE : 8"

TYPE OF CASING SEAL : GROUT/BENTONITE

DEPTH TO TOP OF ROCK : 10 TO 66 FT BLS

DEPTH TO BOTTOM CASING : 80 TO 116 FT BLS

DIAMTER OF HOLE IN BEDROCK : 6"

DESCRIBE IF CORE REAMED WITH BIT:

DESCRIBE JOINTS IN BEDROCK AND DEPTH :

ELEVATION DEPTH OF HOLE 66 TO 187 FT BLS

Figure 2.5 Typical well construction diagram for an open borehole monitoring well.

AR301209

TABLE 2.3

MONITORING WELL CONSTRUCTION DETAILS
AIW FRANK/MID-COUNTY MUSTANG SITE

Well	Type of Completion	Casing/Riser Depth	Total Depth	Casing/Riser Backfill
MW-1	Open Bore	8.5	50	Grout to Surface
MW-2	Screened PVC	23	43	Grout to Surface
MW-3	Open Bore	35	50	Grout to Surface
MW-101	Screened PVC	80	100	Sand pack to 72 ft BLS Bentonite seal to 70 ft BLS Grout to Surface
MW-103A	Screened PVC	20	40	Sand pack to 18 ft BLS Bentonite seal to 16 ft BLS ½" gravel to 4 ft BLS Grout to surface
MW-103B	Open Bore	68	132	Grout to Surface
MW-104A	Open Bore	25	95	Grout to Surface
MW-104B	Open Bore	105	140	Grout to Surface
MW-105A	Open Bore	20	100	Grout to Surface
MW-105B	Open Bore	110	175	Grout to Surface
MW-106	Open Bore	26	78	Grout to Surface
MW-107A	Open Bore	28	55	Grout to Surface
MW-107B	Open Bore	65	80	Grout to Surface
MW-108A	Open Bore	65	197	Grout to 16 ft BLS ½" gravel to 4 ft BLS Grout to surface
MW-109A	Screened PVC	26	39	--
MW-109B	Open Bore	56	70	Grout to surface
F-1	Open Bore	64	85	--
F-2	Open Bore	17	223	--
P-1	Open Bore	--	172	--

BLS - Below Land Surface

AR301210

Monitoring wells installed offsite included one shallow upgradient well (MW-101) installed between AIW Frank and Church Farm School. This well was used in conjunction with the other newly installed and existing wells to confirm local groundwater flow directions, and further testing for the presence of upgradient sources of contamination.

A shallow well (MW-102) was proposed to be installed on the south side of Route 30, across from the Meridian Bank; however, due to access agreement difficulties, the well was eliminated. This well would have been installed to investigate whether the high levels of contamination detected in the bank well could be due to groundwater contamination sources originating on the south side of Route 30.

A shallow/intermediate well pair (MW-103A, MW-103B) was installed downgradient of the site, on the south side of an apparent groundwater divide identified from previous water level measurements (discussed in Section 3.6.2). These wells were used to help delineate the groundwater flow direction and rate, the lateral and vertical extent of contamination, and more accurately define the orientation of the groundwater divide.

An intermediate/deep well pair (MW-104A, MW-104B) was installed northwest of the production area and immediately downgradient of the Pipe Maintenance Services facility. These wells helped determine groundwater flow directions and rates, and the vertical and lateral extent of groundwater contamination. The analytical data also provided evidence to determine whether Pipe Maintenance Services is an additional source of contamination in the area.

An intermediate/deep well pair (MW-105A, MW-105B) was installed on the north side of Valley Creek, east of North Ship Road in a soy bean field. These wells helped to determine the downgradient extent of the plume. The wells were originally proposed to be installed on the Hedberg property west of North Ship Road and south of Valley Creek; however, due to weather conditions deteriorating the integrity of the soil in the area, the property was inaccessible with the drill rig.

A final offsite shallow/shallow well pair (MW-109A, MW-109B) was installed downgradient from MW-104A and MW-104B, and upgradient from MW-105A and MW-105B. The wells were located on the south side of Valley Creek adjacent to a small surface water impoundment. These wells were also installed to determine the extent of groundwater contamination downgradient of the site.

Two onsite wells and one onsite well pairing were also installed. One intermediate onsite well (MW-106) was installed near the former location of the former solvent storage tank. Historically, this was the location of the greatest surface soil contamination (BCM, 1983). The exact location of this well was based upon the results of the soil gas survey discussed in Section 2.3.3. The well was installed near the area with the highest soil gas readings.

A shallow/intermediate well pair (MW-107A, MW-107B) was installed immediately downgradient of the rear onsite building. The wells were tested for contamination between the

AIW Frank Site and the Mid-County Mustang and Pipe Maintenance Service facilities, and helped serve to delineate physical aquifer characteristics on site. This area was originally proposed to have one shallow well installed; however, due to the elimination of MW-108B discussed below, field personnel decided that a second well in this area was necessary.

Finally, a deep well (MW-108A) was installed close to existing well MW-2. The deep well was set in bedrock, whereas well MW-2 was set in the overburden. This well, MW-108A, enabled better comparison of contaminant levels between onsite and offsite wells, especially the Mid-County Mustang well, since all of the samples were obtained from the same bedrock formation. This area was originally proposed to have a well pairing installed; however, well MW-108B was eliminated due to the absence of a clearly defined water yielding zone in MW-108A. Also, well MW-2 was already in place as a shallow monitoring well.

After construction, all of the newly installed wells and the onsite pre-existing wells were surveyed to a 0.1-foot horizontal and a 0.01-foot vertical accuracy. Wells were developed after installation. Monitoring well development after installation removed fine sediments, and drill cuttings from the monitored interval of the boring. The development procedures consisted of lowering an electric pump into the well approximately five feet from the bottom of the borehole. The pump was then raised and lowered during pumping to agitate fine sediments trapped within the borehole and/or sand pack. Approximately, three well volumes of purge water removed.

The development water was containerized in an onsite holding tank connected to a filtration system followed by a post-filtration holding tank. The development water was forced through two sock filters to remove possible contaminants such as 1,1,1-TCA and TCE. Following the two sock filters, the development water was passed through a 55-gallon carbon filter and stored in the post-filtration holding tank. Filtered water in this holding tank was eventually disposed of in a nearby sewer drain.

Borehole Geophysical Logging

Per agreement with the EPA, the U.S. Geological Survey, Water Resources Division conducted borehole geophysical logging surveys on selected wells as indicated below:

Well	Natural Gamma Radiation	Single-Point Electrical Resistance	Caliper	Temperature	Fluid Electrical Resistivity	Injected Brine Tracer
P-1	X	X	X	X	X	
F-1	X	X	X	X	X	X
F-2	X	X	X	X	X	X
MW-103A	X	X	X	X	X	
MW-104A	X	X	X	X	X	
MW-105B	X	X				
MW-108A	X	X	X	X	X	
MW-109B	X	X	X	X	X	

AR301212

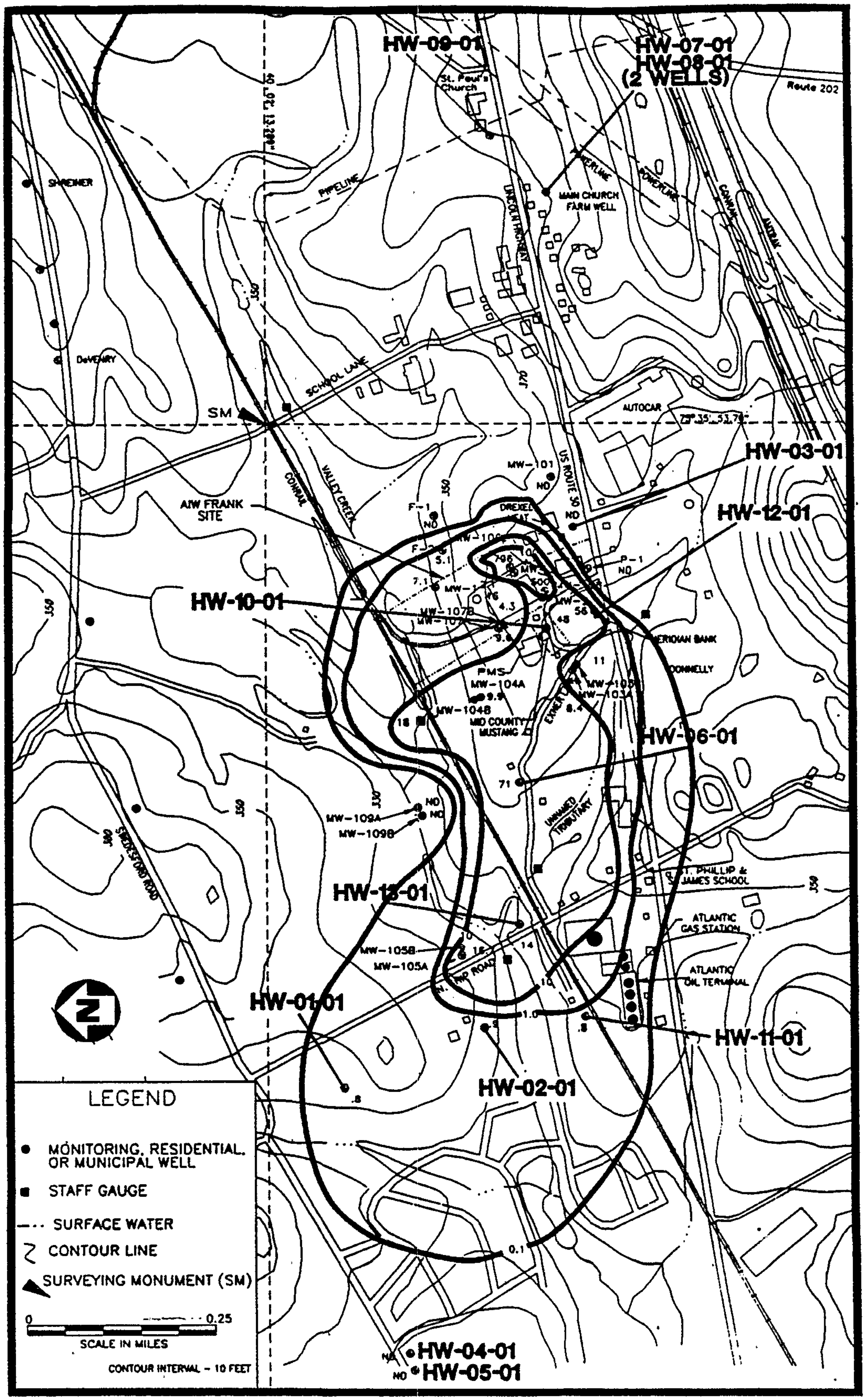


Figure 4.16 Composite concentrations of TCE.

AR301213

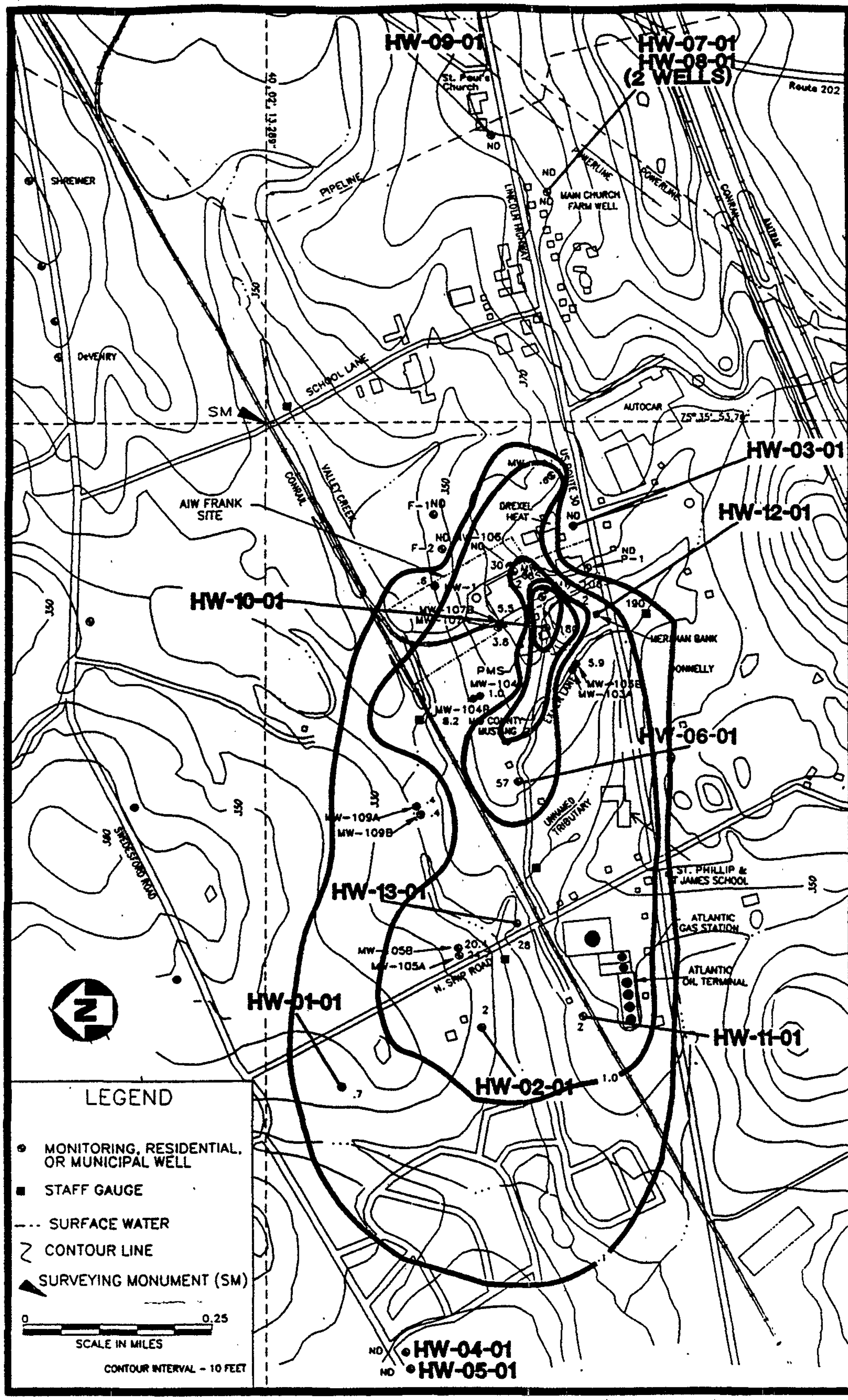


Figure 4.17 Composite concentrations of 1,1,1-TCA.

AR301214